

## A RIVER DOLPHIN FROM KARTABO\* BARTICA DISTRICT, BRITISH GUIANA

BY SAMUEL H. WILLIAMS

*University of Pittsburgh*

(Figs. 33-45 incl.)

In the spring of 1925, the author was placed in charge of a party of graduate students, to conduct a series of investigations at Kartabo, Bartica District, British Guiana. The Bartica District is generally considered to be that region within a radius of six miles with Kartabo as the center. The mean position is 58° 42' West, and 6° 23' North.

Three mighty rivers flow through the district. Of these, the Essequibo, flowing northeast, and carrying a large portion of the drainage waters from the Savannahs, is the largest, having a width of nearly four miles at Bartica. Its largest tributary is the Mazaruni, which runs over a circuitous path from the west, and joins the Essequibo near Bartica. Six miles above this point, the Mazaruni receives the waters from the treacherous and mysterious Cuyuni river which has its origin somewhere in the Venezuelan forests and flows from the Northwest.

At the junction of the Mazaruni and Cuyuni Rivers, situated on the Southern shore of the latter, and surrounded on three sides by the jungle, stands the Tropical Research Station established in 1916 by William Beebe, under the auspices of The New York Zoological Society.

Through the kindness of Mr. Beebe and The New York Zoological Society, the University of Pittsburgh assumed control of the investigations in the summer of 1924, with Dr. Alfred E. Emerson in charge. It was under the auspices of the University of Pittsburgh that the author undertook to continue the work.

From the date of our arrival at Kartabo, and continuing throughout our tenure there, we observed, almost daily between the hours of twelve noon and two P.M., a school of river dolphins which played, or foraged, in the waters of the Cuyuni just opposite the laboratory.

\* Contribution, New York Zoological Society, Department of Tropical Research No. 298.

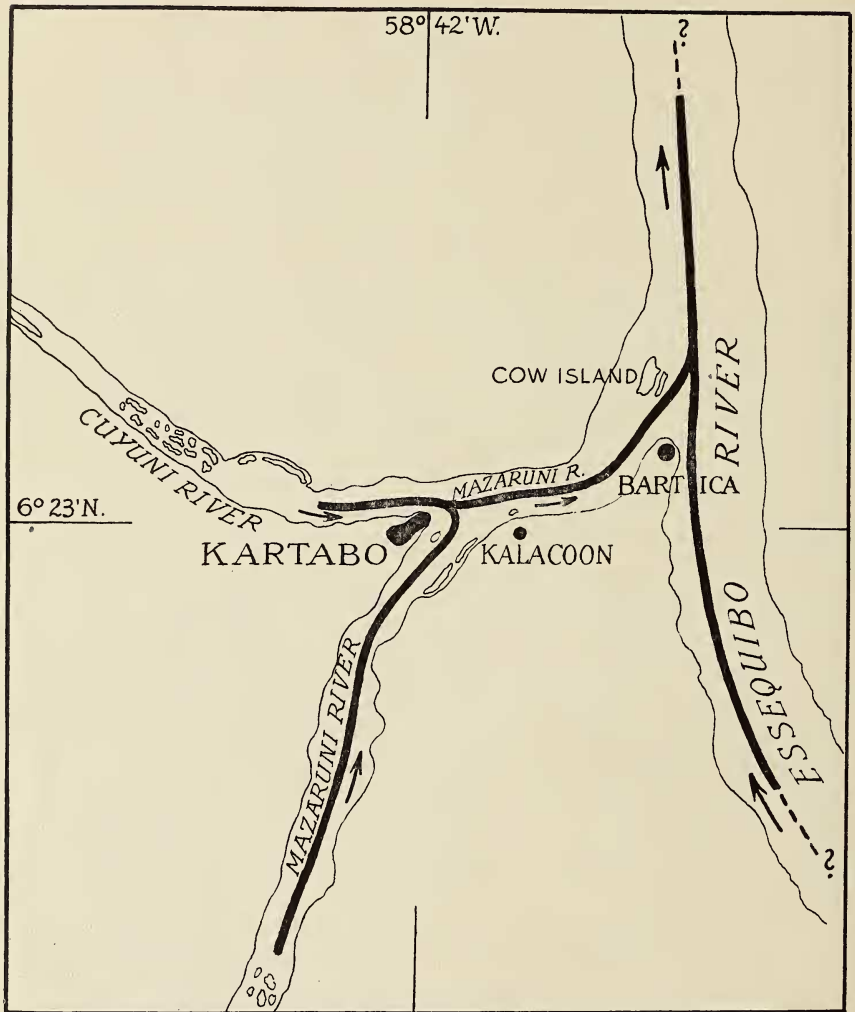


Fig. 34. Sketch map showing the range of activity of *Sotalia guianensis* at Kartabo, Bartica District, British Guiana.

That these animals had been observed for several years prior to this time, is indicated by the fact that Mr. Beebe<sup>1</sup> included them in his list of the mammals of that region. I was later informed by Mr. Beebe that he had seen these animals frequently during the

<sup>1</sup> Beebe: Studies of a Tropical Jungle, etc." Zoologica, Vol. VI, No. 1, 1925. p. 112. In this list Mr. Beebe gives the Genus *INIA*.

period from 1916 to 1924, but that all attempts to capture specimens were unsuccessful.

On numerous occasions we followed the school which numbered eight specimens. It is interesting to note that all of the animals were apparently mature, and there were no indications of younger forms in attendance. In our endeavors to capture specimens we chased the creatures in canoes equipped with outboard motors but we could not surround them. Harpoons, shot guns, revolvers, and high powered rifles were used without success. Two members of the party registered "hits" and, contrary to our expectations, the animals did not rise to the surface but apparently dived into the mud at the bottom of the river and we did not recover either animal.

It was customary for us to stretch a long gill net in the Cuyuni River each evening. The net was drawn at daybreak. In this way we procured an ample supply of fish for our table.

On the morning of August 11, 1925, when the net was drawn, a specimen was found hopelessly entangled in it. The creature had evidently poked its beak through the strands of the net, and being unable to extricate itself, had drowned.

The animal was immediately subjected to a series of measurements and photographed. The torso was removed and preserved in a fifteen per cent solution of formalin. After removing the skeleton, the skin was placed in a strong solution of salt and alum and the whole was shipped to the University for later study.

#### THE RANGE OF ACTIVITY

Observations covering a period of several months, supplemented by informations received from natives, indicated that the range of activity (Fig. 34) of the Cetaceans extended for several miles up and down the three rivers of the District. On frequent occasions the animals were seen to ascend the Cuyuni river for a distance of more than two miles, above Kartabo to Camaria. Further migration in this direction was prevented by a long series of rapids seven miles in extent. At other times we observed the animals in the Mazaruni River in the vicinity of Horaima, which is two miles west of Kartabo. Indians who made frequent fish-shooting expeditions to the rapids several miles further up the river, asserted that they had seen the dolphins near the cataract. At other times, the animals were observed at the mouth of the Mazaruni,



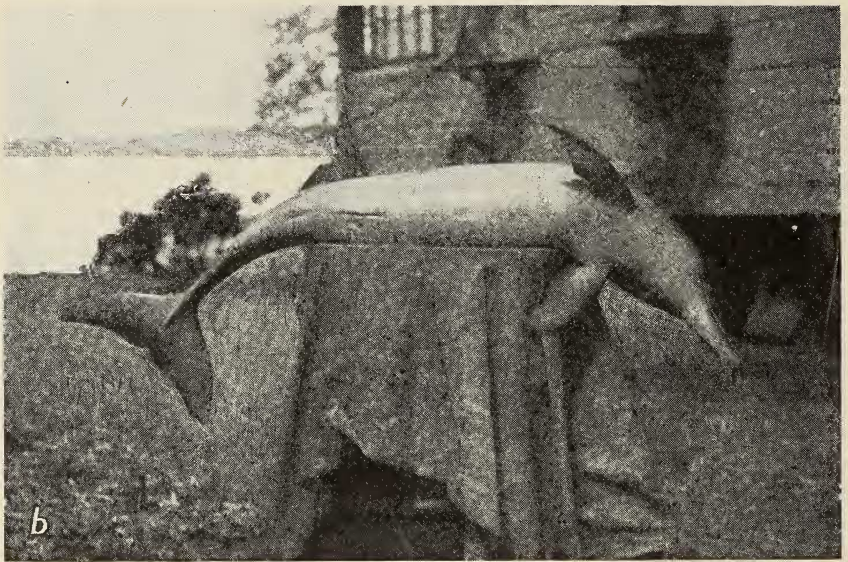
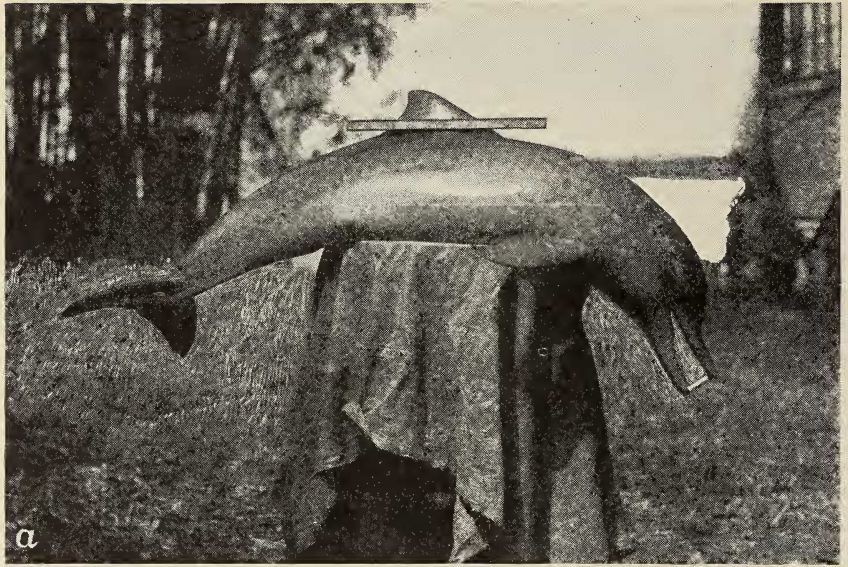


Fig. 35. *a, b, Sotalia guianaensis* Van Beneden.



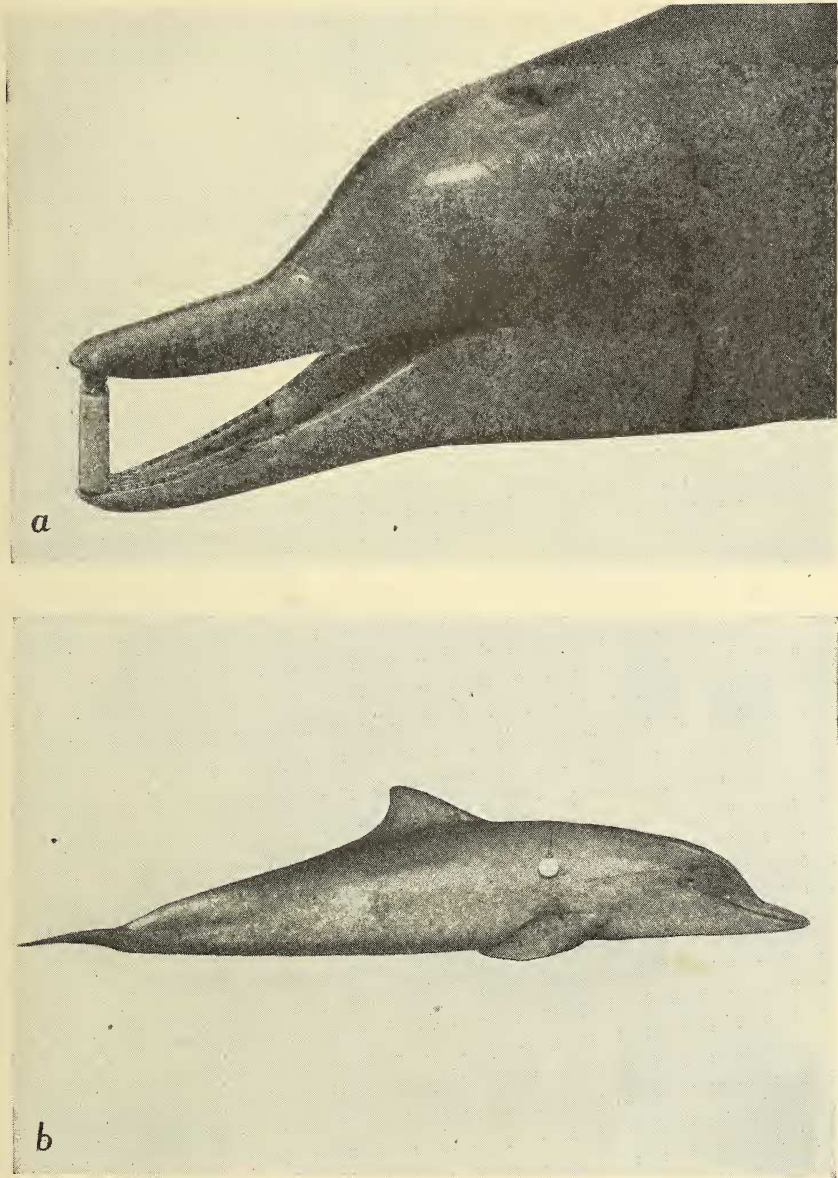


Fig. 36. a, b, *Sotalia guianensis* Van Beneden.

six miles below Kartabo, by various members of the party. Residents of Bartica reported having infrequently seen them in the Essequibo opposite the village. Bovianders, living eight miles below Cow Island toward the sea coast, also reported the frequent occurrence of the animals at that point.

The animals were never seen above the rapids on any of the three rivers, and information received from Indians, substantiated the conclusion that the rapids were insurmountable barriers to migration.

When informed by Indians living along the Cuyuni river, that they had feasted upon several specimens within the past few months, I accompanied a party of them to their village. After some searching among the refuse around their Benabs, I found the remains of two specimens. The bones had been gnawed by dogs and they were in the last stages of decay. They were, therefore, of no taxonomic value.

They were, however, obviously delphinid remains and from the descriptions in my field notes, they were evidently of the same species as the animal we had secured.

#### THE SPECIMEN—EXTERNAL CHARACTERS

The animal, from behind the pectoral fin to the region back of the anus, was of a dull lead color, blending into a pinkish to violet gray along the lateral margins and ventrally (Fig. 37*a*). The pectorals were of the same color as the back.

The external measurements were as follows:

Sex—Male; Locality—Kartabo, British Guiana; Date—August 11, 1925.

Length.....	5 feet 3¼ inches
Weight.....	105 pounds
Head—length.....	11 inches
Mouth—length.....	8¾ inches
Eye—length.....	¾ inches
Spiracle (semi circular)—diameter.....	1 inch
Head girth.....	24½ inches
Body girth before dorsal fin.....	29½ inches
Body girth behind dorsal fin.....	28¼ inches
Caudal girth.....	9½ inches
Beak.....	4½ inches
Anus to tip of tail.....	19 inches
Anus to genital opening.....	5 inches
Dorsal fin—length 11 inches, height 5 inches	
Pectoral fin—length 9¾ inches, width 4¼ inches	

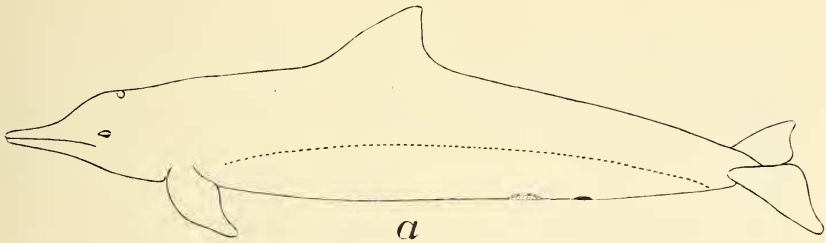


Fig. 37. a, *Sotalia guianensis* Van Beneden. Outline sketch made from field notes



Fig. 37. b, *Sotalia guianensis* Van Beneden; portion of the vertebra showing union of first and second cervicals.



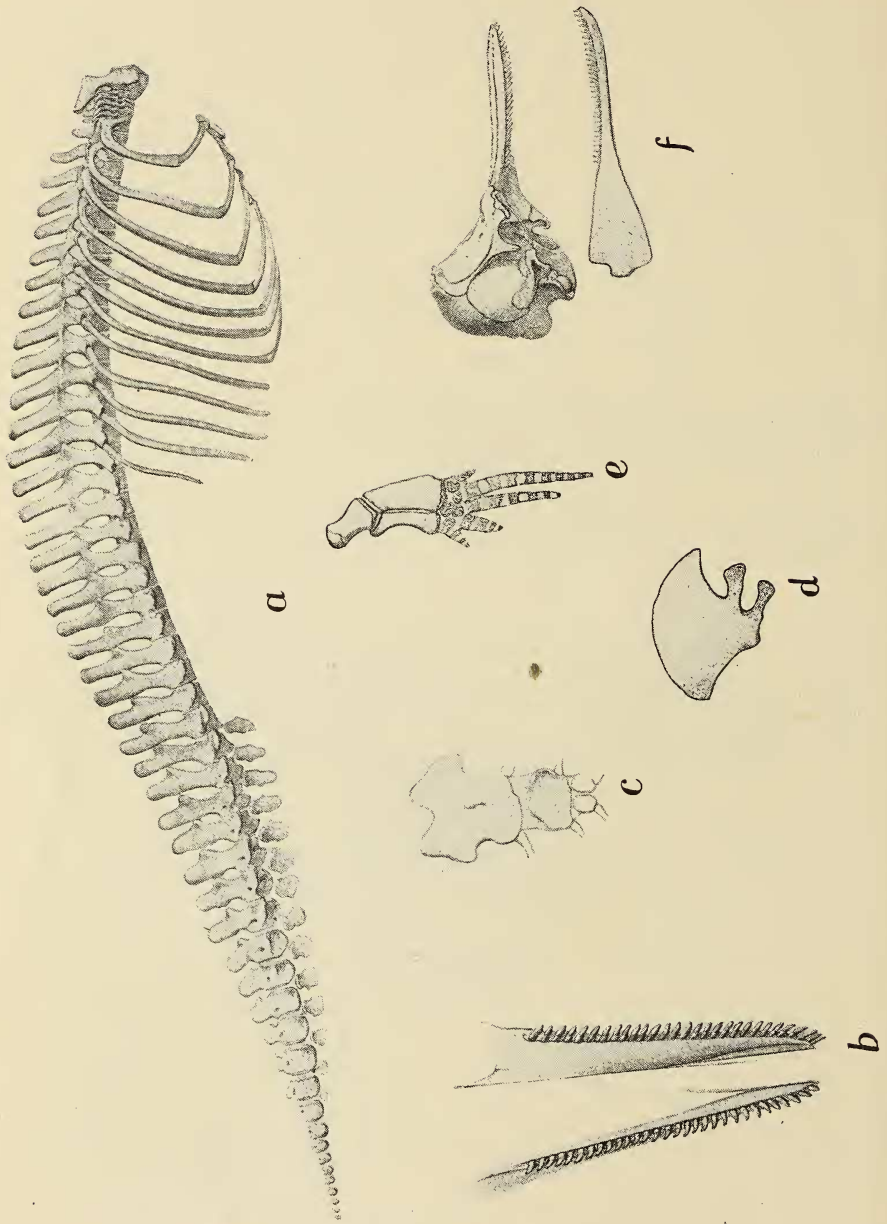


Fig. 38. a, b, c, d, e, f, *Sotalia guianensis* after Van Beneden and Gervais, "Oscotographic des Cétacés, vivants et fossils."

## STOMACH CONTENTS

An examination of the stomach showed it to contain no evidence of Crustacea, although the larger shrimps (*Palaemon amazonicus*) are common. The remains of about thirty-two small herring like fish, and four small cat fish were found. There were also thirty-nine lenses of various sizes, and several otoliths, present. The disintegrated condition of most of the material made the identification of species, virtually impossible.

The Identified Specimen—*Sotalia guianensis* VanBeneden.

A study of the complete skeleton has proved it to be *Sotalia* (*Delphinus*) *guianensis* VanBen. The history and distribution of the genus and species, are worthy of mention. The type was originally described by VanBeneden from a specimen, the locality records of which are somewhat confusing.

A notice of *Delphinus guianensis* appeared in the "Bull. Acad. Royale Belgique, 2e, Ser., Vol. XVI, 1863," but the species was merely indicated as new and no description was given. It was said to have been sent from LaGuyane<sup>2</sup> to the Museum at Stuttgart. The species was definitely introduced as *Delphinus guianensis* in the "Mem. Couron. Acad. Royale Belgique, Coll. in octavo, Tome XVI, 1864." It is here stated that the specimen had been sent from Cayenne, but later on the same page, it is said that the collection containing the animal was from a "Voyageur Naturaliste" in Surinam. VanBeneden at another place "Opusc. Coll. 1857-1887" indicates that the specimen was sent from Cayenne to the Museum at Stuttgart or Würtemberg.

In the "Supplement to the Catalogue of Seals and Whales in The British Museum," 1871, Gray lists *Sotalia guianensis* from British Guiana, and he also states that the specimen is in Stuttgart. In Flower's "List of Cetacea in the Zoological Department of the British Museum," 1885, this record does not appear. True, in "A Review Of the Family Delphinidae," 1889, lists Cayenne as the locality, but he does not refer to the location of the type. Kükenthal, in "Untersuchungen An Walen," 1914, describes the foetus of *Sotalia guianensis* from the Naturalienkabinet at Stuttgart, which was labelled *Steno guianensis*, but he gives no locality record.

VanBeneden and Gervais in "Osteographie des Cetaces, vivants et fossiles, 1880," page 594, state that the descriptions of the genus *Sotalia*, and the species *guianensis*, were made from a specimen taken in Surinam and which was contained in the collection at Stuttgart. However, in the "Explication des Planches" of this work, the figures are stated to have been made from a specimen in the Museum at Louvain. (Fig. 38.)

Sir Sydney F. Harmer, former Director of the British Museum, in reply to my inquiry relative to the locality given by Gray, and to the present location of the type, says "It is not clear to me what is the correct locality. Cayenne may have really been the port of shipment and Surinam is, perhaps, the probable locality. . . 'Gray's Catalogue, 1871, p. 67, mentions *Sotalia guianensis*,' but although he mentions British Guiana as the locality, he does not imply that the species is represented in the British Museum. The locality mentioned by Gray is presumably copied from the 1866 Catalogue, p. 257."

<sup>2</sup> French Guiana.

Dr. M. Rauther, Director of the Württemberg Naturaliensammlung at Stuttgart, informs me that a skin, skeleton, and foetus of a female specimen of *Sotalia (Delphinus) guianensis*, are in the collection there (Nr. 1122). The specimen is labelled "Maroni River, Surinam, Kappler, 1865." Dr. Rauther says in part "Es ist leider in unseren altern Zuwachsverzeichnisses nicht vermerkt, ob dass stück Nr. 1122 das origin alexemplar für die Beschreibung VanBeneden ist. Da Sie anscheinend in dem Werke von VanBeneden, P. J., & P. Gervais, 'Osteographie des Cetaces recents et fossiles,' Paris, 1868-1877, eine Angabe gefunden haben, wonach das Originalalexemplar sich in der Stuttgarter Naturaliensammlung (früher Naturalienkabinet) befände, so ist es immerhin wahrscheinlich dass unser Stück dies Original ist."

True (1889) states that there are at least two specimens of *Sotalia guianensis* in European Museums. He does not indicate, however, that he was aware of their exact locations, and I have been unable to verify the existence of the specimen in Louvain, to which VanBeneden refers.

In order to positively locate the present whereabouts of the type and other specimens, I later wrote to Dr. Rauther, calling his attention to the fact that the species was definitely introduced in 1863, two years prior to the date attached to the specimen. He informed me that they had two specimens of *Sotalia guianensis* at Stuttgart. Both were taken in the Maroni river which separates Cayenne (French Guiana) and Surinam (Dutch Guiana). The locality may, therefore, have been either country. The type specimen (Nr. 1122) was received after its description by VanBeneden. The other specimen had been received earlier and it was the foetus from this that Kükenthal (1914) had described. Dr. Rauther's letter definitely establishes the locality and present location of the type and substantiates my former conclusions. After reviewing the abstract of my investigations Dr. Rauther writes "Nach dem von Ihnen uns freundlicherweise mitgeteilten Auszug aus der *Sotalia guianensis* betreffenden Literatur erscheint es auch mir sicher, dass unser Stück Nr. 1122 als Typus der Species zu gelten hat. Der von VanBeneden 1864 gebrauchte Ausdruck "Voyageur Naturaliste" bezieht sich sicherlich auf den Herrn Kappler, der in Niederländisch—Guyana (Surinam) tätig war und von dort in dem Zeitraum von 1843 bis 1884 reich-haltiges Tiermaterial an unser Museum geliefert hat. Die Jahreszahl 1865 auf der Etikette unserer *Sotalia guianensis* ist vermutlich so zu erklären, dass dieses Stück hier erst in das Zuwachsverzeichnis eingetragen wurde, nachdem es bereits VanBeneden zur Bearbeitung vorgelegen hatte; dass sie also nicht das Jahr der Erbeutung, sondern dasjenige ser Aufnahme in unseren Katalog bedeutet. Bei der Durchsicht des zwischen VanBeneden und dem damaligen Vorstand unserer Sammlung, Dr. Krauss, geführten Briefwechsels fand ich leider nicht mehr auf die Sache Bezügliches, als eine kurze Nachschrift in einem Briefe VanBeneden vom 3.7. 1863 (July 3d); "Le Delphin guyana est decrit et fig. dans nos bulletins. Je vous ai envoye un Ex. par Marcus (?) de Bonn. Si vous ne l'avez pas deja, vous le recevrez." Die Fassung der Mitteilung lässt immerhin schliessen, dass das beschriebene Tier Krauss bekannt war, also wohl nach Stuttgart gehörte.

Was die Localität der Erbeutung unseres Stücks angeht, so haben wir keinen zwingenden Grund zu zweifeln, dass die Angabe: "Maroni-River" zuverlässig



ist; sie findet sich allerdings nur auf der Etikette, nicht in dem Katalogeintrag. Jener Fluss bildet die Grenze zwischen Niederländisch Guyana und Französisch Guyana. Daher erklärt sich wohl das Schwanken der Angaben in der Literatur zwischen "Surinam" und "Cayenne"; es mag sein, dass die Verschiffung von Cayenne aus Stattgefunden hat, wie Sir *Sydney F. Harmer* vermutet.

Das in meinem Briefe vom 19 angeführte "weitere Skelett" trägt übrigens auf der Etikette folgende Bezeichnung: Nr. 533 *Steno guianensis* VanBen. Marowini-Mündung, Surinam, Kappler 1854. Es ist also erheblich früher an unser Museum gekommen, als Haut und Skelett v on Nr. 1122."

Inasmuch as the species is more or less a marine form and not a true river form, it is not unusual or strange that it exists at present in British Guiana which is only about two hundred miles from the location of the type.

#### THE DISTRIBUTION OF THE GENUS

The genus *Sotalia* is represented by ten species, two of which are somewhat doubtful.<sup>3</sup> Only three of these are indigenous to South America. *Sotalia tucuxi* Gray, has been taken in the Amazon from Brazil to Peru. A single skull (Cat. no. 21499) in the collections of the United States National Museum, which was purchased from a Biological Supply House, is believed by some writers to be that of *Sotalia tucuxi*. Although there are no records attached to the skull, it is thought to have been originally found in Florida waters.

*Sotalia brasiliensis* VanBeneden<sup>4</sup> was taken in the Bay at Rio de Janeiro. The specimen was a very young animal and its actual specific characters are still a matter of controversy.

In addition to *Sotalia guianensis* from Surinam and British Guiana, the genus is represented by the following species: *Sotalia perniger* (Elliot) Blyth., from the Indian Ocean, *Sotalia lentiginosus* Owen, from India and Ceylon, *Sotalia plumbea* (Dussumier) Cuvier, also from India and Ceylon, *Sotalia teuszii* Kükenenthal, from Camerroun, and *Sotalia sinensis*, Flower, from the China sea and the Foo-Chow and Canton rivers. The two doubtful species are: *Sotalia santonicus* Lesson, from the Atlantic Ocean and *Sotalia maculiventer* Owen, from the Indian Ocean.

#### TAXONOMIC CHARACTERS

When VanBeneden first described the species he ascribed the name *Delphinus guianensis* to it. However, Gray (1866), in describing certain forms created the genus *Sotalia*. Later (1870) Flower placed the specimen of VanBeneden in this genus because of marked differences between it and the genus *Delphinus* of Linné. The summary of generic characters given by Gray (1866-1871) and by Flower (1870), is as follows: Rostrum long, narrow, and compressed. Symphysis of mandible long or moderate. Pterygoid bones separate, narrow, and divergent posteriorly. Post orbital process of frontal, narrow. Lower jaw rather broad behind, palate flat. Teeth slender, conical, smooth, 26-35.

<sup>3</sup> Trouessart: "Catalogus Mammalium."

<sup>4</sup> Van Beneden: "Mem. Acad. Belg. XLI, 1875."

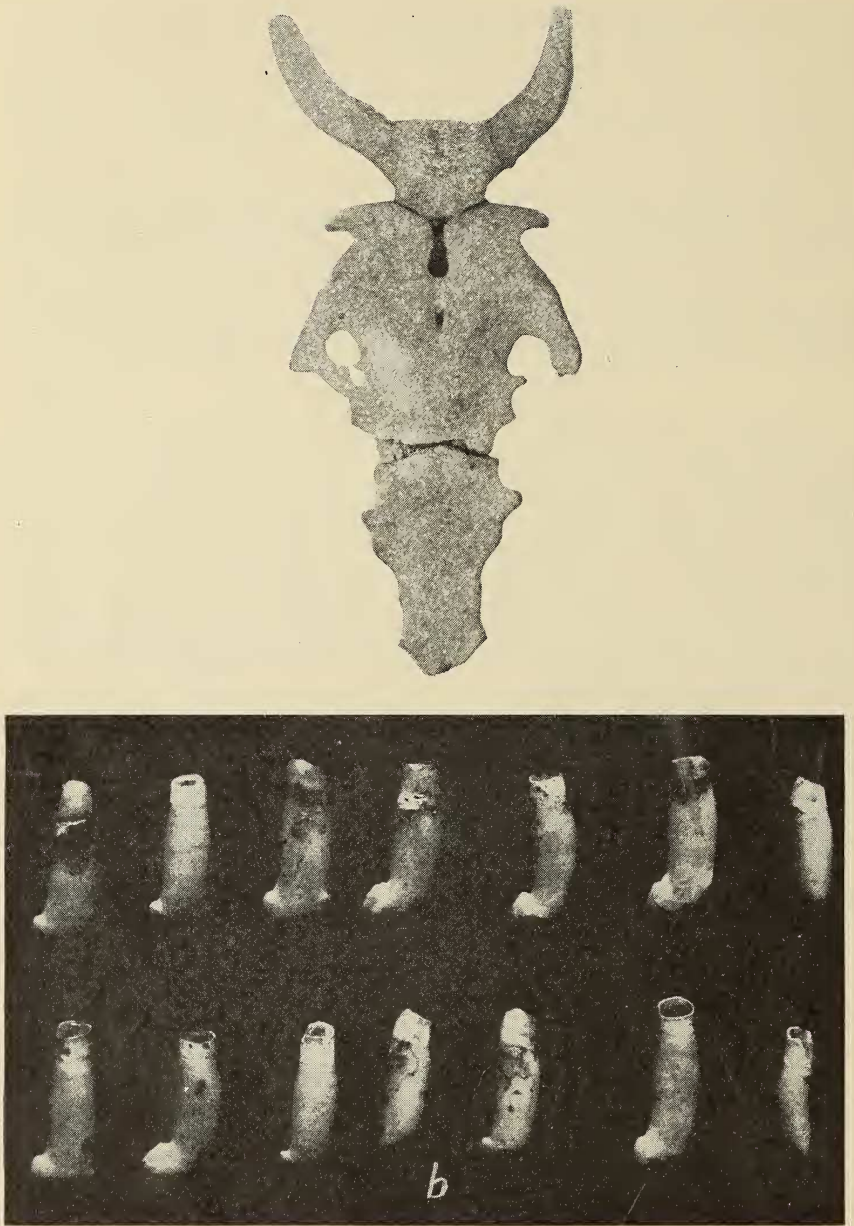


Fig. 39. *a, b, Sotalia guianensis* Van Beneden; *a*, upper figure sternum; *b*, teeth.

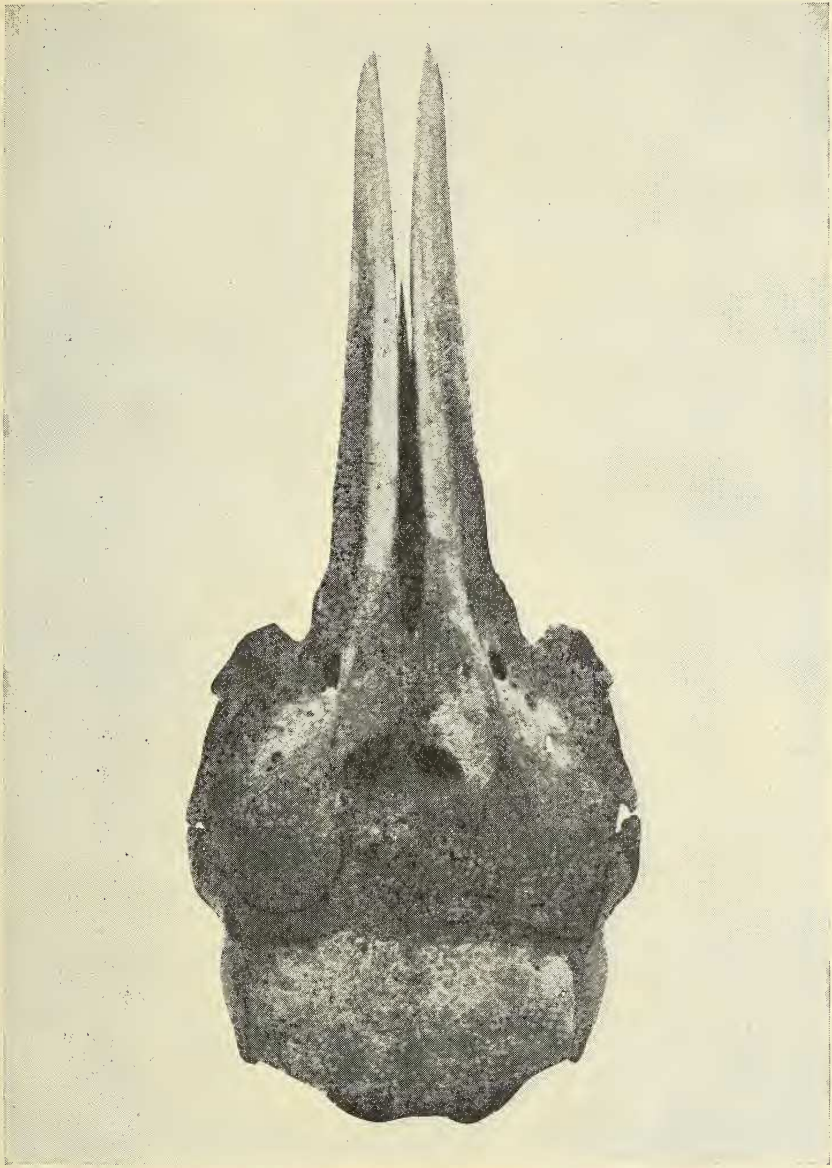


Fig. 40. *Sotalia guianensis* Van Beneden; the rostrum is long, narrow and compressed.



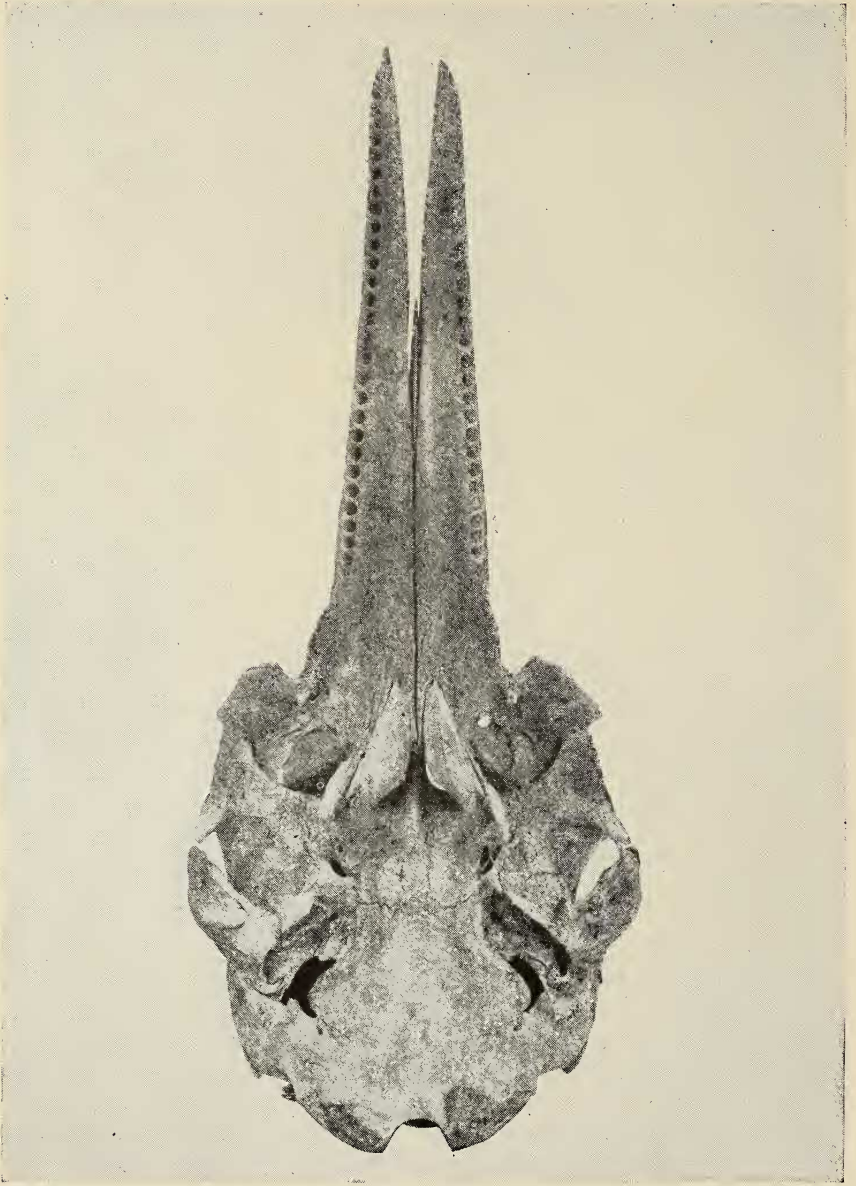


Fig. 41. *Sotalia guianensis* Van Beneden; the pterygoids are separate and divergent posteriorly.

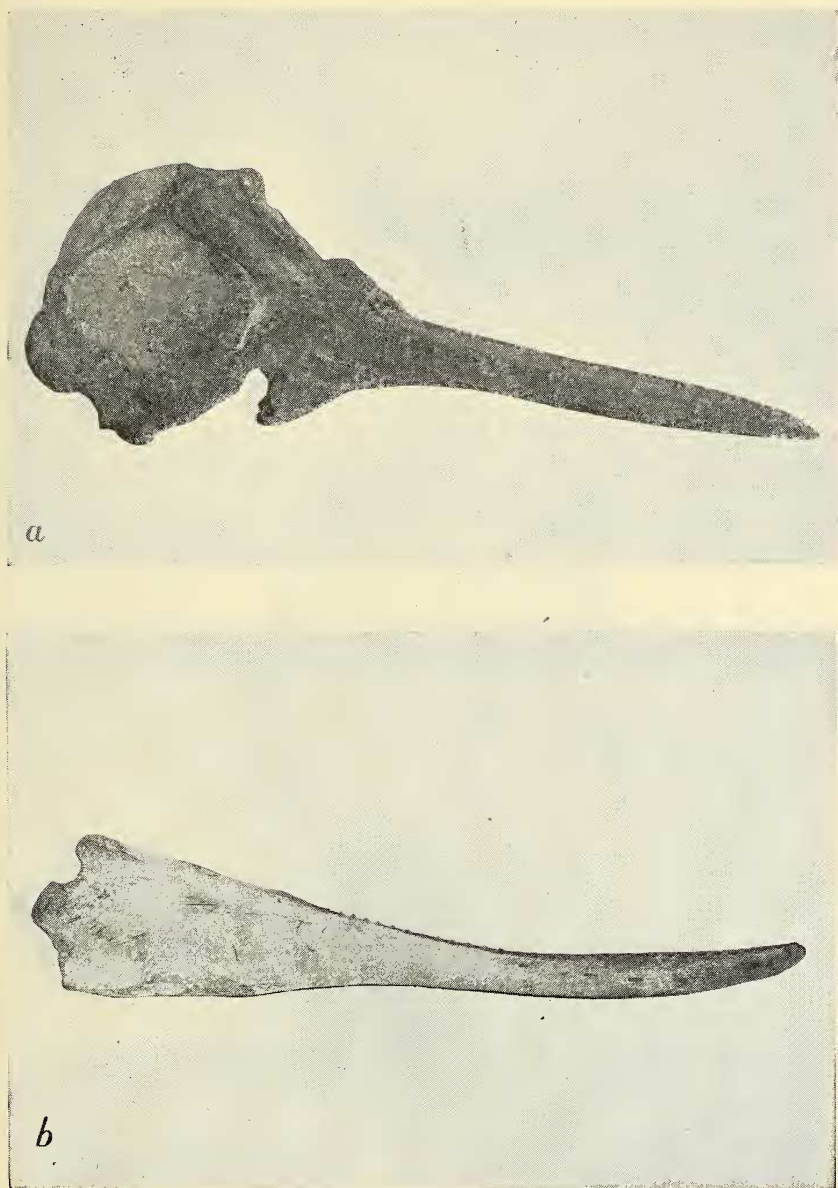


Fig. 42. *a, b, Sotalia guianensis* Van Beneden; *a*, upper jaw; *b*, lower jaw is high behind and curved.



Fig. 43. *Sotalia guianensis* Van Beneden; the humerus is shorter than forearm and radius is broad.



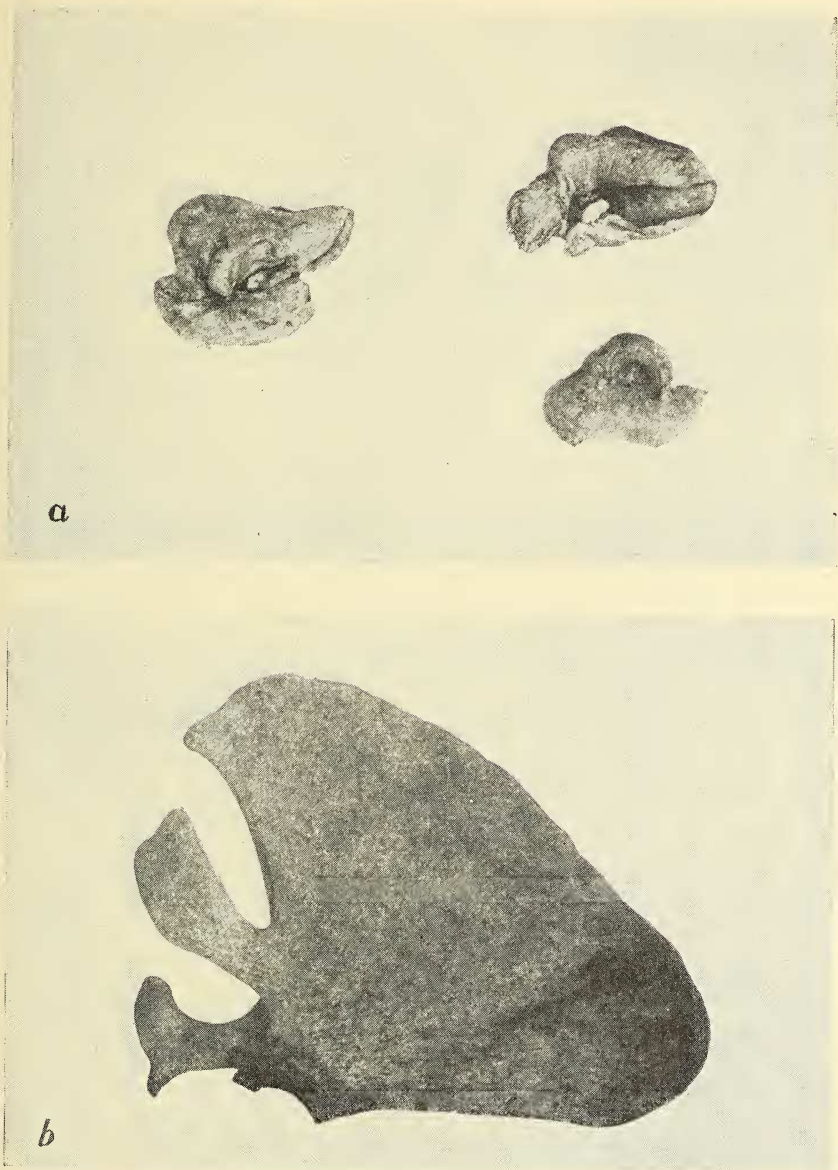


Fig. 44. *a, b, Sctalia guianensis* Van Beneden; *a*, tympanid bones; *b*, the scapula showing the coracoid and acromion.

Vertebra 51-55. Scapula broad, Acromion broad. Dorsal fin falcate, moderate. Color, white or gray, sometimes spotted: no bands of dark color. Scarcely distinct from *Steno*.

The three chief characters that distinguish the genus *Sotalia* from *Steno* and *Tursiops* are (1) the separation of the pterygoids, (2) the more limited number of caudal vertebrae, and (3) the greater number of teeth. (True—1889.)

The specific characters are, Vertebrae 55: Thoracic 12, lumbar 14, caudal 22, cervical 7. The first and second cervicals are united. The five others are free and have long bodies, making the neck long. The caudal vertebrae form two distinct series, the first thirteen have large bodies, and are much higher than broad; the first nine have upper spinous apophyses well developed; and the first seven have transverse processes; the twelve chevron bones are very strong; the last nine caudal vertebrae are much depressed and they are twice as broad as high. Ribs 12: 12; the first four, only, have double articular surfaces; the first five are articulated to the sternum. The sternum is formed of three distinct bones, the front being the largest.

The pectoral fin is only rather longer than broad, and is not so long as the arm bones united: the blade bone is much extended in form and has the acromion and the coracoid well developed. The two bones of the fore arm are rather longer than the humerus. The radius is very broad. Carpal bones five, in two rows, the three upper ones being the largest: Metacarpals five. There is no phalanx for the thumb, only one for the little finger, six phalanges for the index finger, and four for the ring finger.

"The skull is rounded on all sides, the falx is ossified, the face is slender, the nasal canal open, the romer is shown above between the two intermaxillaries. The jaws have 32 : 29 teeth, of which two are in the intermaxillary bones. The teeth are conical, acute, rather far apart. The tympanid bone is two lobed. The petrous bones are without apophyses. The lower jaw is very high behind and curved, giving it the appearance of a *Ziphius*" (VanBeneden).

The animal under discussion possessed only fifty three vertebrae. The vertebral formula is: cervical 7, thoracic 12, lumbar 14, caudal 20-?21. The individual vertebrae agree very well with those of the type, except for abbreviations and elongations of the spinous and lateral processes. These variations are of no great importance as I shall later indicate. The union of the first and second cervicals and the long bodies of the others, are clearly shown (Fig. 37-b). The sternum is shown (Fig. 39-a).

The skull agrees fairly well with the original description. The rostrum is long, narrow and compressed (Fig. 40). The pterygoids are separate and divergent posteriorly (Fig. 41). The teeth do not agree in number with the type, the formula being 31 : 30. However, several of the teeth were immature and decidedly out of line. The others were so badly worn (Fig. 39-b) that only the slightest trace of enamel could be seen on a small number of them. It is virtually impossible to suggest the nature of the enamelled surface although in form, they were evidently slender and conical. The lower jaw is high behind and curved. (Fig. 42-b.)

Unfortunately the cartilaginous character of certain of the hand bones,

caused a loss of the thumb in the extraction and preparation of this organ. However, it will be noted that the humerus (Fig. 43) is shorter than the bones of the forearm and that the radius is broad. The carpals, metacarpals, and phalanges, are characteristic.

The tympanid bones (Fig. 44-a) are more definitely fixed and are, perhaps, of very important taxonomic value. The scapula is high and broad. The acromion and coracoid are well developed. (Fig. 44-b.)

In addition to the characters shown in the plates, the skeleton exhibited other features which might be of interest. The vertebra having the greatest dimension from tip to tip of the lateral processes, is the twenty-second which measures 12.7 cm. The vertebra having the greatest depth (craniad-caudad), is the atlas which measures 2.64 cm. The axis is the smallest in craniad-caudad depth, being only .59 cm.

The bodies of the thoracic and lumbar vertebrae, are almost circular. The centra of the first six vertebrae and those of vertebrae twenty-three to forty-three, inclusive, are also nearly circular. The seventh to the twenty-first vertebrae are somewhat flattened on the dorsal surfaces of the centra. There are concave indentations on the centra of the twenty-third to forty-third vertebrae. Number twenty-three shows the first sign of this indentation and there is a gradual increase in its depth until the fortieth. Beginning with forty-three and forty-four, the bodies of the vertebrae gradually become flattened dorso-ventrally, numbers forty-eight, forty-nine, and fifty, being the most noticeably so. Vertebrae numbers twenty-eight and twenty-nine, have concave indentations on their lateral spines. In a number of vertebrae, particularly, numbers fifteen, sixteen, seventeen, eighteen, and nineteen, the lateral processes are shorter on the left side. Vertebrae numbers twenty-one to fifty, seem to be almost bilaterally symmetrical.

While the specimen under discussion exhibits some differences from the type, there would be no justification for assuming that any or all of these differences are sufficiently distinct to be of specific or varietal value. Any attempt to separate a single individual with such marked similarities to a known species, could not be accepted in the light of conservative investigation.

In accounting for differences it must be borne in mind that the type was probably a female, while the present specimen is a male. Fischer (1881) states that the male rostrum is usually more elongated, more regularly tapering forwards, and less dilated in its middle portion, than that of the female. Usually the cranium is higher and the temporal fossae are more ovoid in the latter sex.

No dependence can be placed upon the number of teeth in discriminating species. This particularly applies to species in which there is a great number because those at the ends of the series are usually much smaller and frequently imbedded in the gums. In fact the number on one side may be greater than that on the other in the same animal.

Flower (1883) says "In all dolphins the form of the skull alters considerably with age. The rostrum or beak becomes larger in older animals, being both longer and wider in proportion to the brain case. The teeth become actually larger in consequence of a more considerable portion of the broad base of the crown arising out of the alveolus as the slender apex wears away, and they

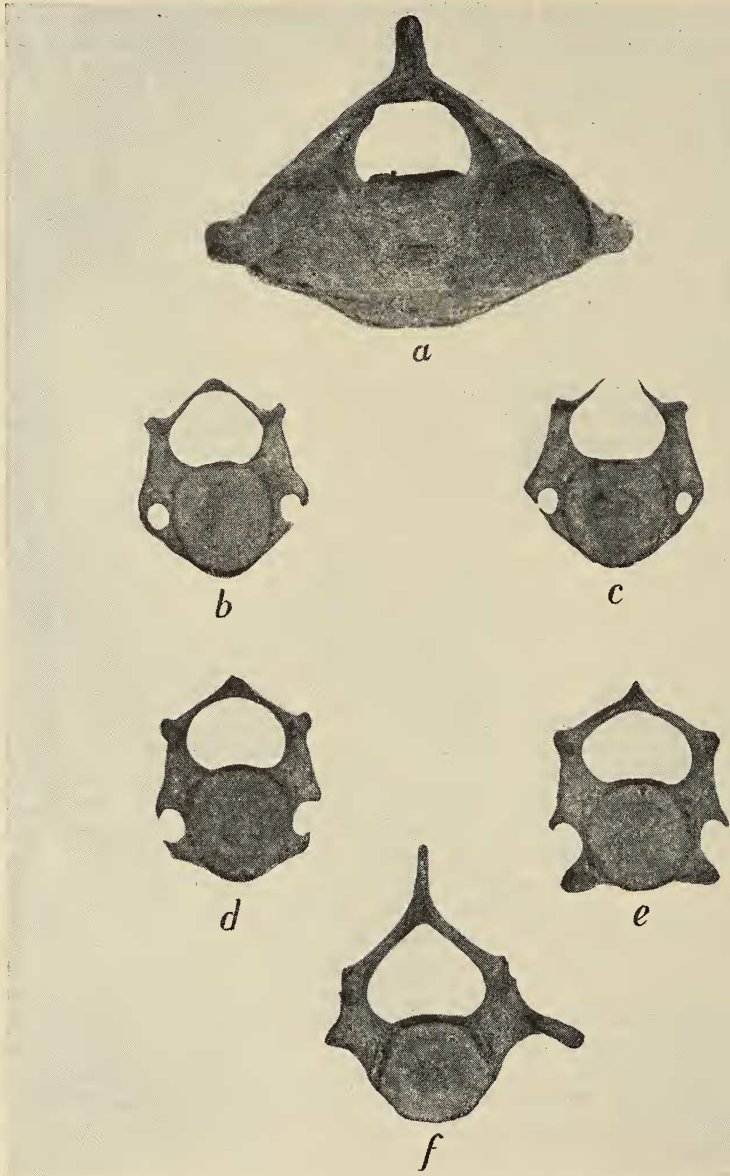


Fig. 45. *a, b, c, d, e, f, Sotalia guianensis* Van Beneden; *a*, axis vertebra; *b, c, d, e*, vertebra showing varying character of lateral foramina; *f*, vertebra with no indication of lateral foramina.



become more distant from each other through the growth of the maxillary bones. Thus the proportion of length and width of the beak, and the number of teeth in a given space, cannot be relied upon except in comparing adult animals. It is extremely difficult to tell the relative age of the individual as, contrary to what takes place in many other mammals, the sutures of the cranium close very early in the dolphins. Even the basilar suture which in seals, for instance, is united only with old age, no traces are left in dolphins about three-fourths grown, and in which the epiphyses are all free on the vertebrae and on the bones of the limbs, and of which the carpus is but imperfectly ossified."

The comparative osteology of the dolphin skeleton shows that it exhibits a series of wide variations, even within the individual, which contrast it noticeably with the greater constancy of the average mammal. The phylogeny of the Cetaceans would indicate that the osteoblastic structure of their skeletons would be far less compact than that of the domestic cat, for instance. Miller's treatise (1923) on the telescoping of the Cetacean skull indicates a lesser degree of fixity than is to be found in many other mammalian forms. Within the individual, there exists a wide variety of osteological peculiarities. The specimen under discussion exhibits many characters which fall within the range of individual differences. It might be well to direct attention to a few of these. The axis vertebra (Fig. 45-*a*) is shown. It is not completely ossified to form a neural canal. Another peculiarity is that the small lateral foramina on the right do not completely form a foramen, while the foramen on the left is complete. Fig. 45-*c* shows the complete enclosure of only one foramen. Fig. 45-*d, e* show vertebrae four and five to have only partial or semi-circular foramina. Fig. 45-*f* shows vertebra number six to exhibit no signs of lateral foramina. This part also shows only one prominent lateral process, the other being slight. The caudal vertebrae are far less fixed than the others, and certain phalangeal bones in the hand showed no degree of ossification.

In the determination of species on the basis of skeletal similarities, it is well to bear in mind the primitive character of certain modified parts. Much has been written on the subject of the modifiability of the Cetacean physiognomy. The increase in the number of phalanges and teeth, have been discussed at length by Kükenthal, Abel, Winge, and others. Even proportions, which in some rather definite mammalian forms, exhibit post natal changes, should be considered with extreme caution and viewed from an embryological basis. Only extremely obvious characters in the vertebral skeleton (of Delphinids), which in no way appear to be deformities, or, of pathological origin, should be considered in speciation.

#### ACKNOWLEDGEMENTS

The author wishes to thank Sir Sydney F. Harmer, former Director of the British Museum and Dr. M. Rauther, Director of the Württemberg Naturaliensammlung in Stuttgart, for their assistance in establishing the exact locality and present location of the type, and for checking the results of his investigations.

To: Mr. Calvin Fisher Fencil, a Graduate Assistant in the Kartabo Party: Mr. Edgar P. Jones, Photographic Assistant: Mr. Theodore Fredley and Mr. Crane Remaley, graduate students in the Zoology Department, who generously assisted in preparing and photographing the specimen, the author is deeply grateful.

Dr. Gerrit S. Miller, Jr., of the United States National Museum, kindly supplied the photostatic copies of Van Beneden's plates, which are greatly appreciated.

Prof. Dr. Ferdinand Pax of the Zoologisches Institut and Museum in the University at Breslau, read and criticized the manuscript.

Especial thanks are due Professor Harold D. Fish and Dr. William Beebe for making these South American studies possible.

SAMUEL H. WILLIAMS

*Zoologisches Institut and Museum der Universität Breslau,  
November 29, 1927.*

## BIBLIOGRAPHY.

- BATES, W. A.  
1864 A Naturalist On The Amazon.
- BEEBE, WILLIAM.  
1925 Studies Of A Tropical Jungle, etc. Zoologica Vol. VI, No. 1.
- CUVIER, G.  
1829 Le Regne Animal d'apres son organization, pour servir de base a l'histoire naturelle des Animaux et d'introduction a l'Anatomie Comparee. Tome 5, 2nd Ed.
- FISCHER, P. H.  
1881 Cetaces du Sud-Ouest de la France. Actes de la Societe Linneene de Bordeaux.
- FLOWER, W. H.  
1870 Description of The Chinese White Dolphin (*Delphinus sinensis*). Transactions of the Zoological Society Of London VII, p. 159.  
1883 On The Characters And Divisions Of The Family Delphinidae. Proceedings Of The Zoological Society Of London, pp. 476-513.  
1888 Osteologie der Säugerthiere.
- GERVAIS, F. P.  
1855 Animaux nouveaux ou rares, recueillis pendant l'Expedition dans le partres centrales le l'Amerique du Sud. In Castelnau's Zoologie de l'Expedition dans le partres centrales de l'Amerique du Sud. Part VII.
- GRAY, JOHN EDWARD.  
1866 Catalogue Of The Seals And Whales In The British Museum, p. 257.  
1868 Synopsis Of The Species of Whales And Dolphins in The Collections Of The British Museum.  
1871 Supplement To The Catalogue Of The Seals and Whales In The Collections Of The British Museum, p. 401.  
1856 Annals And Magazine Of Natural History series 2, XVII.
- KUKENTHAL, WILLY.  
1914 Untersuchungen an Walen. Jena Zeitschrift LI, pp. 90-91.
- MILLER, GERRIT S., JR.  
1918 A New River Dolphin From China. Smithsonian Miscellaneous Collections Vol. 68, No. 9.  
1921 A translation of The Interrelationships Of The Cetacea by Adolph Winge. Smithsonian Miscellaneous Collections Vol. 72, No. 8.  
1923 The Telescoping Of The Cetacean Skull. Smithsonian Miscellaneous Collections Vol. 76, No. 5.
- OWEN, SIR RICHARD.  
1866 On Some Indian Cetacea Collected by Walter Elliot Esq. Transactions Of The Zoological Society of London.
- REYNOLDS, SIDNEY H.  
1913 The Vertebrate Skeleton.

TRUE, FREDERICK W.

- 1889 A Review Of The Family Delphinidae. Bulletin U. S. National Museum No. 36.

VANBENEDEN, P. J.

- 1864 Sur un Dauphin Noveau (*Delphinus guianensis*), et un Ziphiode rare. Manifestation En L'Honneur P. J. VanBeneden, p. 27. Opusc. Coll. 1857-1887. Louvain.

- 1863 Memoires Corrones de l'Academie de Royale de Belgique. Collection in octavo, Tome XVI, Mem. 2, p. 23.

- 1875 Memoires de l'Academie de Belgique XLI.

VAN BENEDEN ET GERVAIS

- 1880 Osteographie des Cetaces, Vivants et Fossiles.